California State Fisheries Laboratory
Terminal Island, California

THE RESOURCES AGENCY OF CALIFORNIA
DEPARTMENT OF FISH AND GAME
MARINE RESOURCES OPERATIONS

REPORT FOR THE MONTH OF JANUARY 1966

The anchovy reduction fishery began in southern California on January 3. Since that time 2,081 tons have been processed at Port Hueneme and San Pedro. Fishermen are receiving $20 per ton. Most of the fish have been caught in the San Pedro Channel (Zone II), Santa Barbara Channel (Zone I) and off Santa Cruz Island (Zone IV).

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Crab catches are low in the San Francisco area. In the Eureka area fishing is much better, and dealers restrict landings to hold the harvest to their estimate of demand.

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The new Pesticide Monitoring project (BCF contract) in estuarine waters has established sampling stations in Humboldt, Tomales, Drakes, San Francisco, and Morro Bays. Samples of shellfish from the several environments were processed for analysis for chlorinated hydrocarbons.

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Rockfish and kelp bass led the party boat catches for 1965. Bonito, the 1964 leader, fell to third place. Compared to 1964, barracuda fishing was up. The salmon and striped bass fisheries, however, declined.

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The 1965 albacore season was the worst commercially since 1947 but the sport catch was the best since 1961.

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A tagged Calif. halibut captured at Morro Bay marks the first recovery north of Point Conception. This 17-pound halibut grew 2-inches and moved 130 miles in 208 days.

MARINE RESOURCES OPERATIONS

REPORT ON 1965

PELAGIC FISH PROGRAM

Anchovy

The Commission authorized a limited anchovy reduction fishery late in the year. The staff will be augmented by three biologists early in 1966 to allow close monitoring of the fishery and to conduct a tagging program.

Anchovy back data

Anchovy age composition data for seasons 1957-58 through 1964-65 were subjected to computer analysis and should be available for publication during the first quarter of 1966.

Aerial survey data for the years 1956-64 have been compiled and analyzed. A report recommended that the surveys be terminated. The recommendation was approved.

Jack mackerel age

Age reading of jack mackerel otoliths collected during the 1947-48 through 1961-62 seasons is nearly complete. Completion of these determinations will eliminate our most serious backlog of jack mackerel data. On completion of age composition analysis (January 1966) one of the most valuable of vital statistics will be available for critical study.

Sardine studies

Sardine age composition manuscripts for 1962-63, 1963-64, and 1964-65 seasons are either completed or nearing completion.

Mackerel studies

Mackerel sampling procedures have been revised, along the lines of random sampling procedures, in order to facilitate computer analysis and provide estimates with confidence limits.

Data reports

Real progress is being made in compiling sea survey data for past years into data reports. We are accomplishing this by punching all of our data into IBM cards, then utilizing a computer to sort and summarize these data. The computer output is processed directly into finished data reports through a photographic process. We have completed coding years 1950-1961; at years end one of these had been printed as the first number of the new CalCOFI Data Report series, and three additional years had been submitted to the printer.

Survey cruises

Seven cruises totaling 125 days at sea were undertaken by the sea survey

project during the year. The first of these was a short gear development cruise; the second an experimental fathometer survey of southern California. The latter cruise was particularly noteworthy in that it was quite successful in locating spawning anchovies over a broad offshore area. The remaining five cruises formed our annual fall survey. We found sardines absent in southern California waters, and relatively scarce throughout Baja California. Anchovies were again found everywhere, although in somewhat smaller amounts than last year.

Midwater trawl

We have developed a new, smaller midwater trawl as a sampling tool on survey cruises. The new net has been successful in capturing all program species, while being easier, faster, and safer to handle.

Publications

Daugherty, Anita E. 1965. Marine mammals of California. Dept. Fish and Game, Sacramento, California.

Hyatt, Harold. 1965. The southern California mackerel fishery and age composition of the Pacific mackerel catch for the 1959-60 and 1960-61 seasons. Calif. Fish and Game, 51(1):37-47.

Messersmith, J.D. 1965. Southern range extensions for chum and silver salmon. Calif. Fish and Game, 51(3):220.

Messersmith, James D. 1965. Review of the pelagic wet fisheries during the 1961-62 and 1962-63 seasons. CalCOFI Repts. X:8-9.

Messersmith, J.D. and Harold Hyatt. 1965. Pacific mackerel, the commercial fishery, and age composition of the southern California catch for the 1961-62, 1962-63, and 1963-64 seasons. Calif. Fish and Game, 51(3):168-182.

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TUNA PROGRAM

General

Staff vacancies and numerous unscheduled assignments drastically curtailed anticipated progress in the tuna program during 1965. Despite this, we managed to make good progress in a number of important fields.

Cooperative Tuna and Marlin Tagging Project with Mission Bay Research Foundation

This project succeeded in marking and releasing 1 bluefin tuna, 505 albacore, 253 striped marlin, and 18 sailfish off southern California and Baja California. Two Mexican biologists representing the Instituto Nacional de Investigaciones Biologio Pesqueras also participated in tagging marlin and sailfish.

Bluefin Tuna Migrate to Japan

Two bluefin tagged in the California fishery in 1962 were recaptured near Japan in 1965. This brings the number of bluefin transpacific migrants to five and demonstrates conclusively that fishermen on both sides of the Pacific harvest the same stock.

Albacore Prediction and the Preseason Survey

The annual albacore prediction, mailed to over 500 commercial fishermen in June, was successful again this season. We predicted that the main body of fish would move into the grounds between San Juan Seamount and Guadalupe Island, with the Showboat and Five-Fathom Spots most likely to provide the first catches in offshore areas. Inshore, the waters near San Clemente Island, Santa Catalina Island, and in the San Nicolas Basin appeared favorable for albacore catches so we predicted fair sportfishing there. As it turned out, a short hot fishing flurry developed, but it did not provide the quantities of fish that we anticipated.

Tuna Conference

The tuna staff presented several excellent papers at the Sixteenth Pacific Tuna Conference. This internationally-attended meeting was convened at the University of California, Residential Conference Center, Lake Arrowhead, September 27-29, 1965.

Population Studies

Bluefin tuna from southern Australia may comprise a separate population from those caught by the California fleet. Electropherograms of eye lenses from these two areas are very different indicating a third subspecies of Thunnus thynnus.

Publications

Clemens, Harold B. and William L. Craig. 1965. An analysis of California's albacore fishery. Calif. Dept. Fish and Game, Fish Bull. (128): 301 p.

Clemens, Harold B. and William L. Craig. Ms. Ocean temperature and albacore behavior. Japan Tuna Fishery Res. Conf., Kochi, Japan.

William L. Craig. In press. Status of the 1965 Pacific Coast Albacore Fishery Pac. Mar. Fish. Comm., 18th Annual Rept.

SPORTFISH PROGRAM

Tagging

California halibut - 929 tagged. Sand bass - 514, (261 on cruise, 253 donated by the Seahorse Spinfishing Club of Costa Mesa. This club has held 4 tagging events; all fish have been donated to the Department.

Research

A collection of 0- and 1-ring Calif. halibut was completed, materially advancing an age-length study of the species. A study of escapement in the Calif. halibut trawl fishery shows that larger mesh cod ends would permit greater numbers of sub-legals to avoid capture.

Kelp bass length frequencies (San Clemente) indicated 1/3 of catchables were legal fish. Kelp and sand bass partyboat catches in 1965 are over 1 million fish, (3rd year in a row, and the only years in which a million were tagged).

Approximately 30,000 partyboat logs have been processed and summarized.

Blue Rockfish Management Study (DJF19R)

The Blue Rockfish survey was terminated in mid 1965 with completion of life history studies and catch sampling programs. The data were analysed and submitted in December of 1965. Preparation is underway to undertake a sportfish survey from San Francisco to Monterey.

Environmental and Behavioral Studies of Coastal Sportfish (DJF22R)

Considerable time and effort was expended, during the past year, preparing a comprehensive manuscript of the knowledge gleaned from our visual observations of artificial reefs. This rather extensive paper, "Artificial Reef Ecology," discusses: the various reef materials; preferences of fishes for a material; configurations necessary for proper reef construction; animal assemblages, successions and behavioral traits; occurrence of algae on the reefs; and a descriptive guide to the invertebrates encountered during our nearly 7 years of SCUBA diving surveys. This manuscript will be submitted to the editors during the early part of 1966 and hopefully will be in print before the year's end.

Project divers conducted surveys offshore of Point Loma, San Diego County (for the San Diego Regional Water Quality Control Board #9) and around the Orange County Sanitation District's ocean outfall (for the Santa Ana River Basin Water Quality Control Board #8) to record the biota present and to document changes, if any, attributable to the operation of sewer outfalls in these areas. In general, the area surveyed off Point Loma did not show any adverse changes; however, because the outfall was operative only 18 months when the survey was conducted, insufficient time may have elapsed for subtle changes to have become apparent. Offshore, near the outfall terminus, the appearance of a hardy species of polychaete worm does indicate an adverse environmental change attributable to the outfall. Further study of both the nearshore and offshore areas is definitely warranted.

Off Orange County the animals appeared typical for the areas surveyed with two exceptions: (i) the number of species encrusting the last 100 feet of the outfall pipe was limited compared to the central section, and (ii) species diversity and numbers on a nearby artificial reef was considerably less than observed on artificial reefs in Santa Monica Bay which had been submerged for similar periods at similar depths. This Orange County reef is directly influenced by the effluent field, which probably accounts for the restricted speciation.

Underwater survey techniques, developed during these and our prior surveys, are being employed by biologist-divers throughout the scientific community.

The major importance of these surveys is that this is the first time SCUBA diving biologists have conducted quantitative and qualitative surveys around an ocean outfall to assess the biota present and compare it with similar surveys conducted prior to outfall operation. By conducting these meaningful surveys, the adequacy of water quality standards can be checked, and polluted water conditions prevented.

Project divers are conducting a study of the spiny lobster; its behavior, migration, and condition throughout the year. Samples are collected each month, weighed, measured, sexed, and carefully compared with similar samples taken throughout the year. During the collecting of each sample, diving-biologists note the water temperature, animal's behavior, bathymetric range of the animals and numerous other data.

Project personnel spoke to a variety of groups (diving clubs, college classes, SCUBA diving instructors class, YMCA groups) informing them of the work we are doing and the importance of understanding the ecology of the ocean.

Southern California Sport Fish Survey (DJF20R)

A sampling plan was formulated and implemented to provide the basic data for a study of sportfishing activities from the marine shoreline in southern California. The geographical boundaries of this creel census are the United States-Mexican boundary on the south and Jalama Beach State Park on the north. Gathering of field data began April 1, 1965, and is scheduled to end March 31, 1966. The final report is due December 31, 1966.

The creel census data from our 1964 survey of private vessels was organized, processed, and analyzed during 1965.

In summary, we found that 2.72 million man hours of fishing was expended in capturing an estimated .957 million fish composed of 67 species.

Publications

Fitch, John E. 1965. A relatively unexploited population of Pismo clams, Tivela stultorum (Mawe, 1823) (Veneridae). Proc. malac. Soc. London, (36):309-312.

Schott, Jack W. 1965. A visual aid for age determination of immersed otoliths. Calif. Fish and Game, 51(1):56.

Gotshall, D. W., J. Gary Smith, and Allen Holbert. 1965. Food of the blue rockfish, Sebastodes mystinus. Calif. Fish and Game 51 (3):147-162.

Miller, Daniel J. and D. W. Gotshall. 1965. Ocean sportfish catch and effort from Oregon to Point Arguello, California, July, 1957 - June, 1961. Calif. Dept. Fish and Game, Fish. Bull. (130):135 p.

Miller, D. J., D. W. Gotshall, and R. J. Nitsos. In press. The field guide to some common ocean sport fishes. Calif. Dept. Fish and Game, Sacramento.

Turner, Charles H., Earl E. Ebert, and Robert R. Given. 1965. Survey of the Marine Environment Offshore of San Elijo Lagoon, San Diego County. Calif. Fish and Game, 51(2):81-112.

Turner, Charles H., Earl E. Ebert, and Robert R. Given. 1965. The Marine Environment in the Vicinity of the Orange County Sanitation Districts' Ocean Outfall. A report to the Santa Ana River Basin Regional Water Pollution Control Board (#8). Mimeographed: 1-33 pg.; incl. tables, figs. app., Terminal Island, Calif. June, 1965.

Turner, Charles H., Earl E. Ebert, and Robert R. Given. 1965. The Marine Environment Offshore of Point Loma. A report to the San Diego Regional Water Quality Control Board (#9). Mimeographed: 1-110 pgs. incl. tables, figs., app., Terminal Island, Calif. Dec., 1965.

Turner, Charles H. and Jeremy C. Sexsmith. 1965. Marine Baits of California. Resources Agency of California, Department of Fish and Game, 70 p.

Diving Officer

Three biologists from Marine Resources Operations and two wardens, Region 3 and 5, were certified as Departmental SCUBA divers during 1965. The Department now has 24 certified divers to use in conducting research or law enforcement.

In October, a diving workshop was conducted in Monterey for all certified divers. During lecture sessions the attendees discussed: (i) the Department Operations Manual--SCUBA section, and how these rules apply to Department divers; (ii) new diving methods and techniques; (iii) deep diving problems; and (iv) surf entry and associated diving problems. Field sessions dealt with the techniques of: (i) ditch and recovery of equipment; (ii) free ascent from 80-foot depths; (iii) surf entry; and (iv) general safe diving practices. Twenty Department divers were present during one or more days of the session.

SHELLFISH PROGRAM

Abalone Cruises

Two underwater surveys during September and December were completed in the Pt. Estero - Cambria area. Results of these cruises will yield vital information in regard to the abalone population density, sizes, mortality and growth.

Crab Predictions

Pre-season surveys were conducted in both the San Francisco and Eureka areas. The San Francisco prediction is for another poor season of fishing in 1965-66 with the landings expected to be approximately 1.1 million pounds. Eureka area fishermen can again expect improved catches for the 1965-66 season with the landings predicted at about 6.8 million pounds. Predictions made annually by marine biologists at the Menlo Park and Eureka Laboratories have been very close to actual landings.

Tagging studies have been initiated both inside and outside Humboldt Bay to

gain more knowledge of growth rates and migration patterns of legal and sub-legal crabs. Preliminary information based on a few returns indicate that the crabs move out of the bay to adjacent shallow ocean waters.

Oyster Culture

Hanging culture experiments with European flat oysters, two species of oysters from Mexico and giant Pacific oysters were continued in the bays of central California. Growth and survival have been excellent for the European oyster in Tomales, Morro and Drakes Bays. This species has matured and spawned in these bays. It is hoped that the spawning stock of the Europeans can be built up so that a successful natural set can be obtained.

Shrimp Cruises

Three shrimp cruises were conducted on the Area A (Crescent City-Eureka) shrimp bed during the year. Shrimp biologists predict good shrimping during 1966 because of the strong 1964 year class. The shrimp should be of a larger size and be more marketable in 1966. Valuable growth, mortality and year-class strength data were obtained during the cruises.

Shrimp Larvae

Shrimp were reared through 11 larval stages by biologists at the Redwood City temporary laboratory. This marks the first time that this species has been reared successfully from the egg to the post-larval stage. The project was financed by Pacific Marine Fisheries Commission research monies. A non-technical report including drawings and descriptions has been submitted to PMFC and the technical manuscript is undergoing final editing before submission to Crustaceana.

Publications

Poole, Richard and Gotshall, Dan. 1965. Regulations and the market crab fishery. Outdoor California. 26(9) 7-8.

Poole, Richard. 1965. Preliminary results of the age and growth study of the market crab (Cancer magister) in California, Marine Biological Association of India, Symposium on Crustacea, Cochin, India, Jan., 1965.

Poole, Richard. 1965. Identification of Cancer magister larvae. Pac. Mar. Fish. Comm. 16th and 17th Annual Report for the years 1963 and 1964. pp. 53-54.

Jow, T. 1965. California-Oregon cooperative crab tagging study. Pac. Mar. Fish. Comm. 16th and 17th Annual Reports for the years 1963 and 1964. pp. 51-52.

BOTTOMFISH PROGRAM

Long Term Programs

The program of market sampling for age and size composition of flatfish

landings was continued in 1965. Little change has occurred in ages and sizes of Dover, English, or petrale sole during recent years.

Animal food landings were also sampled for species composition at all ports of landing. The species composition changed slightly in 1965 with the inclusion of northern California species as animal food landings were resumed at Fort Bragg and Eureka.

Logbook and landing ticket information were processed preliminary to compilation by the Biostatistical section.

Flatfish Tagging

No California experiments were conducted in 1965 but returns from previous tagging were processed. Over 23 percent (675) of the 2,864 petrale released off central California in 1964 have been recovered to date. The existence of another petrale spawning deep off Fort Bragg was confirmed by these returns along with catches of the commercial fleet. A northward summer migration is indicated by recoveries as far north as Washington coastal waters.

English sole tagging results from releases made between 1936 and 1963 were analyzed and a preliminary manuscript drafted. Tagging was conducted in all major fishing areas. The results suggest that several population groups of English sole exist off California.

English Sole Growth Studies

Analyses were completed of studies conducted in Monterey Bay during the previous two years. The results are in manuscript form and were presented at the October American Fisheries Society meeting in San Francisco.

Rockfish

Studies of rockfish systematics were continued. A SCOFIELD cruise in southern California waters yielded considerable material for further studies. A new, provisional California rockfish key was completed and a limited distribution made for field use.

Sablefish

Boat catch analyses for 1964 were completed. The data show that the stocks could stand additional harvesting.

Publications

Nitsos, R. J. 1965. Species composition of rockfish (family Scorpaenidae) landed by California otter trawl vessels, 1962-1963. Pac. Mar. Fish. Comm. 16th and 17th annual report for the years 1963 and 1964. pp. 55-60.

Nitsos, R. J. and P. H. Reed. 1965. The animal food fishery in California, 1961-1962. Calif. Fish and Game 51(1): 16-27.

Phillips, J. B. 1965. Northern range extension for the zebra perch, Hermosilla azurea Jenkins and Evermann. Calif. Fish and Game 51(1) 55.

Phillips, J. B. 1965. Range extension of the bigmouth sole, Hippoglossina stomata. Calif. Fish and Game 51(2) 125.

Smith, J. G. 1965. A second record of the pelagic armorhead, Pentoceros richardsonii Smith 1849, in California waters. Calif. Fish and Game 51(3)213-214.

Best, E. A. and J. Gary Smith. 1965. Fishes collected by midwater trawling from California coastal waters, March, 1963. Calif. Fish and Game 51(3) 248-251.

Gotshall, D. W. and Tom Jow. 1965. Sleeper sharks (Somniosus pacificus) off Trinidad, California with life history notes. Calif. Fish and Game 51(4): 294-298.

SPECIAL PROJECTS PROGRAM

Artificial Reefs

The largest artificial fishing reef built off California up to that time was installed off Oceanside in June. It was financed by the W.C.B. This was the seventh quarry rock reef built and consists of 2,000 tons of rock.

A second 2,000 ton reef financed by W.C.B. funds was installed off Ventura in August.

Survey and plans and estimates were completed for artificial reefs around seven southern California fishing piers to be built with 1964 Bond Act money, administered by the W.C.B.

Sea Otters

Four aerial sea otter censuses were conducted during the year. The high count of almost 500 otters was made under ideal conditions in June.

Sea Lion Census

The first sea lion census flown since 1961 was also completed in June. A count of 22,167 sea lions in California coastal and island waters compared to the 1961 count of 25,038. In addition, a count of 3,563 elephant seals, the highest count on record, and 1063 harbor seals was made.

San Francisco Bay Study

The biological survey of San Francisco Bay has completed its third year of data collection. This study has routinely trawled at six stations each month and has collected several hundred thousand fish of seventy species. The information gathered demonstrates an improvement in bay water quality which has been a departmental objective for many years. Many of the fish taken have been displayed in the Steinhart Aquarium. Over five thousand English sole have been collected for a study on cancer being done at the University of California.

BIOSTATISTICS

New Computer Programs

Total Value of Commercial Species - This computes values for the annual catch bulletin at an annual saving of $200 over the previous method of calculation.

Sablefish Boat Catch Analysis - Completely automates the preparation of this yearly report which used to require three weeks of clerical time.

Shrimp Sea Survey - Three programs are used to select random trawl locations, select sub-samples from catches, and estimate relative abundance of the age groups.

Publications

Greenhood, Edward C. and David J. Mackett. 1965. The California marine fish catch for 1964. Fish Bull., Calif. Dept. Fish and Game, (132):1-45.

Greenhood, E. C. 1965. Statistical report of fresh, canned, cured and manufactured fishery products for 1965. Circ., Calif. Dept. Fish and Game, (39):1-16.

Abramson, Norman J. 1965. Von Bertalanffy growth curve II, IBM 7094, UNIVAC 1107, Fortran IV. Trans. Amer. Fish. Soc., 94(2):195-196.

Miscellaneous

Sample surveys were designed for estimating relative abundance of shrimp and absolute age composition of Pacific mackerel landings. All Marine Resources programs received assistance in the form of data processing reports, special computer runs or statistical advice.

Special Assignments

Greenhood, with the assistance of Herb Frey, performed a Herculean service by compiling and writing the marine section of the California Fish and Wildlife Plan.

Shellfish Pathology Conference

The Eighth Annual Conference on Shellfish Pathology was held at the University of Delaware, Newark, Delaware, January 24-25, 1966. H. G. Orcutt attended the conference. He presented the disease and mortality problems in shellfish in California and outlined the program for the study of shellfish mortality which Marine Resources Operations is beginning this year.

Attendance and participation at the meetings included representatives of research, management, and education agencies of the Atlantic and Pacific coast states and Canada.

Oyster diseases along the Atlantic seaboard have persisted for several years. Mortalities have been so high in some estuaries that production has dropped drastically and companies with long histories have met financial disaster. Recent mass mortalities as high as 50% in certain northwest oyster producing areas and cumulative mortalities of 25% in California beds from unknown causes gives the west coast industry concern and prompts us to become aware of the pathogens and possible controls.

The most destructive pathogen is a haplosporidian which infects the tissue of the shellfish, and, in two seasons, has been known to reduce natural populations so that for several years, commercial production is impossible.

Concurrent studies in the epidemiology of oyster diseases were reported in detail. The life history of haplosparidians and techniques of disease study were described. The most recent developments in histology, cytochemistry, and electron microscopy, as applied to the study of shellfish diseases were discussed. Of considerable concern are the findings of disease organisms in very young oysters of Great South Bay, New York. This has prompted action to prevent the spread of the disease to areas for which transplants had been planned. This is similar to our recent reports of diseases in Taiwan oyster areas where California seed buyers had shown interest.

In eastern Canada, an epidemic disease of oysters has reduced stocks to negligible proportions. One of the features of the problem is that the survivors and their progeny are disease resistant. This inherent resistance gives a ray of hope for reestablishment of a resource by a selection and planting program. Such a program, however, takes several years. Serological techniques are being studied to determine their applicability to more rapid procedures in identification of resistant stocks.

In addition to gaining information for use in a shellfish mortality program, there were fine opportunities to contact representatives of several universities in view of recruiting biologists for California. ---H. G. Orcutt

1. BOTTOMFISH

A. Fishery

Flatfish: Trawling was sporadic due to inclement weather and scattered bottomfish concentrations. Petrale and Dover sole were the major species in Eureka and Fort Bragg landings, while English led at other ports. Total flatfish landings for January were low which is normal for the early part of the year.

Rockfish: The small poundages of rockfish landed reflect the decrease in fleet activity. Channel rockfish caught during deep water trawling for petrale and Dover sole comprised most of the landings at Eureka. Boccacio was the major species in the limited landings at other ports.

B. Research

Flatfish: Landings of Dover, English, and petrale sole were sampled at major ports for age and size composition. Samples obtained last year were analyzed for age.

Sampling procedures were reviewed and, in the future, a "Mackett" double sampling plan will be used to obtain the relative age composition of flatfish.

Eye lenses were obtained at widely separated localities for population studies.

Extra effort was expended in contacting fishermen for logbook data so that 1965 data could be assembled without undue delay. As a result, a slight delay occurred in coding December data.

A draft of the English sole age and growth manuscript was completed.

Rockfish: Taxonomic studies were continued. Examination of several species complexes is in progress using material collected during the fall N. B. SCOFIELD cruise.

Sampling aid was given the Anchovy Monitoring project.

The Bottomfish Program is on schedule.

2. SHELLFISH

A. Fishery

Abalone: Season closed.

Crab: Dealers continue to limit landings at Eureka in view of a limited demand. Fishermen report an average of 10 legals per trap overnight at most locations. At present, the price is 18¢ per pound.

At San Francisco, two fishermen continue to fish with very low catches prevailing. Dealers are paying 24¢ per pound.

Good catches in Oregon and Washington have kept the price down and satisfied the market demand. Oregon and California fishermen recently cooperated on a strike which was effective and fishing restrictions were strictly observed. The price was stabilized at 18¢, but Oregon soon dropped back to 16¢.

Oysters: Oyster production slackened at Eureka and Morro Bay, but harvesting continued at a good rate in Tomales and Drakes Bay. Some oysters of the 1960 planting in Elkhorn Slough are still being harvested.

Shrimp: Season closed.

B. Research

Abalone: Season closed. In the future, this column will be written by Earl Ebert who takes over the abalone project in February.

Crab: The entire month was spent analyzing back data.

At Eureka, the skiff trawl has been proven as a crab catcher and good samples of the 1964 year class were taken. Trips were made aboard the Humboldt State research vessel, Sea Gull, to collect samples from outside the breakwater.

Some log books were passed out to fishermen in an effort to get catch-per-unit-of-effort data. Data is also being collected by the P.M.F.C. port sampler by interview.

The port sampler has recovered several tags from Oregon and is proving very valuable in obtaining information about the fishery.

Oysters and Clams: The Pesticide Monitoring project established stations at Humboldt, Tomales, Drakes, Morro and San Francisco Bays. Samples of oysters will be gathered monthly, processed and sent to the U.S. Fish and Wildlife Laboratory at Gulf Breeze, Florida. This study is under contract with the U.S. Fish and Wildlife Service, Bureau of Commercial Fisheries. Oysters are known to be efficient in removing and storing trace amounts of chemicals from chlorinated hydrocarbon pesticides. The study may make it possible to identify sources of pollution. Samples of oysters from 11 stations were obtained during January.

Pismo Survey: A special Pismo clam census was conducted on Monterey Bay, January 5-7. The census revealed that clams are very scarce at the intertidal zone. It appears that there has not been a set of any consequence for many years. Clams of 0-5 years of age are practically non-existant and clams of 4½ to 5 inches average 17 years of age. This is extremely slow growth. The yield to sportsmen therefore, is from old stock from the last series of successful settings evident in our survey in 1953 when the incidence of younger clams was much higher.

Shrimp: At Eureka, analysis of the shrimp data from hake stomachs has begun and early results are encouraging. An attempt is being made to find a more objective method of aging shrimp using probability paper.

At Menlo Park, the annual shrimp report was compiled and completed and sent to the editor at Terminal Island.

An analysis of size frequency and year class composition of Bodega Bay shrimp from 1954 to 1965 catch samples continued. Preliminary results indicate large variation from year to year in percent year class composition and development.

Shellfish program is behind schedule because of the vacancy in the abalone project.

3. PELAGIC FISH

A. Fishery

Landings in tons	January		January 1 - January 31
			10 yr. mean
Species	1966*	1965	1954-1963**
Anchovy	2315	76	1151
Mackerel, jack	521	432	3350
Mackerel, Pacific	68	40	1308
Sardines	1	31	662
Squid	138 (Market)	1508	337
	3043	2087	6808

* Estimated. Accumulated landings are revised monthly.
** Anchovy, used 6 year mean (1958-1963)

The anchovy reduction fishery started in southern California this month with the first landings at Port Hueneme on the 3rd and in San Pedro on the 11th. Since that time 2,081 tons have been landed. Anchovy log books have been distributed to 35 boats in California. The price settled upon is $20.00 per ton in all fishing areas. In the Monterey area the catch is going primarily for canning (143 tons) with only a reported 39 tons landed for reduction. The primary fishing areas were San Pedro Channel, Santa Cruz Island and Monterey Bay.

Mackerel landings have been caught at San Pedro Bank.

Squid are beginning to show again in Monterey Bay following nearly three months of inactivity. A few hundred pounds were landed near the end of the month. Because of increased demand for this mollusc, freezers have exhausted their stocks, and Monterey has unfilled orders for canned squid.

B. Research

Part-time seasonal aid help has been hired to help on the waterfront sampling for age and size composition at San Pedro and Port Hueneme. Samples are being collected and sent to the BCF lab at Terminal Island for analysis.

C. Live Bait

A preliminary estimate of the live bait landings for 1965 totaled 1,039,638 scoops sold or about 12,995,475 pounds (6,497.7 tons). This is an increase of better than 2 million pounds over 1964. There were 22 boats voluntarily reporting their catches, an increase of two over the previous year. In December six boats reported selling 10,814 scoops (135,175 pounds or 67.5 tons).

The projects anchovy and sardine-mackerel are behind schedule due to position vacancies.

D. Sea Survey

Preparations got underway for a survey of Pacific hake off southern California and northern Baja California. The survey will be a joint effort by the Department and the U.S. Bureau of Commercial Fisheries, and will involve our vessel **ALASKA** and the Bureau's vessels JOHN N. COBB and **DAVID STARR JORDAN**.

The survey will attempt to measure the distribution and abundance of the spawning population of hake found in this area during the spring of the year. The JORDAN will make plankton tows to locate general areas of hake concentrations; the **ALASKA** and the COBB will then attempt to obtain samples of the spawning fish with midwater trawls. The joint effort will provide a fine opportunity to compare and calibrate the gear on the three ships.

The cruise is scheduled for February 20 to March 16.

Data reports for our 1955 and 1950 cruises were mailed out to libraries and research groups in this country and throughout the world, thus making our data available to the entire scientific community. The data report covering the 1951 cruises has been received from the printer, while the report for 1952 is expected shortly.

Project is on schedule.

4. TUNA

A. Albacore

Fishery

There were no landings this month, although one fish was reportedly caught off northern Baja California. Preliminary figures for November (2.5 million lbs.) and December (80,000 lbs.) raised the seasonal total to nearly 23 million lbs. The 49 sport-caught albacore reported for December brought the grand total to almost 90 thousand fish.

The 1965 season was the worst for commercial fishermen since 1947, when slightly over 13 million pounds were landed. The sportcatch, however, was somewhat above average for the past 10 years.

Research

The albacore computer program has been de-bugged, and logbook data for the 1964 season have been summarized and the reports run.

The final lot of logs for 1965 has been edited and is now ready for key-punching.

Albacore age determinations, by scale reading, continued.

A procedural guide, for machine-processing albacore data, is being prepared. We plan to document the entire operation from dissiminating logbooks to completion of final computer reports.

B. Bluefin tuna

Robert Bell resumed his position in charge of the bluefin program on 17 January. He had spent the preceding year on an FAO assignment in Kenya.

Fishery

Although bluefin fishing has ended, 67 tons caught near San Martin and San Geronimo Islands last October were unloaded this month. Some of the smaller seiners turned to squid and anchovies.

Research

Logbooks (520) representing the 1965 season's bluefin catch have received final processing. Bluefin age determinations, by scale reading continued.

Preliminary plans have been made, with the Mission Bay Research Foundation, to tag striped marlin and bluefin tuna this coming season.

The pre-cruise plan for cruise 66S-1 has been completed. Major objectives are to obtain fish eye lenses for use in investigating population structures and phylogenetic relationships, and to collect blood smears for studying hematological variations within taxonomic groups and between groups of fish from different geographical areas.

The Tuna Program remains behind schedule because of position vacancies.

5. SPORTFISH

A. Partyboat

Research

The kelp bass was found not to be hermaphroditic, but, because it shows structural evidence of a hermaphroditic ancestor, it is labeled a secondary gonochoristic form - perhaps a unique position among serranids. A manuscript has been submitted to California Fish and Game supporting this theory.

A 32-inch 17 pound tagged California halibut was recovered by the trawler FLYER at Morro Bay in December. Tagging took place from the ALASKA, May 13, 1965 at Ventura Flats - approximately 130 miles down coast. Growth was 2-inches in 208 days. This is the first recovery north of Point Conception. Robert Ward, seasonal aid at Morro Bay, did a fine job obtaining complete data for the record.

Two tagged sand bass were recovered at the release location after 300 days freedom. The greater growth, 2.7", was shown by a 13½" fish, as compared to 2" for a 17" bass. Both recovered fish were measured alive.

Substantial progress has been made in a study of California halibut age-length.

Fishery

The 1965 partyboat catch of key marine species, through December shows considerable variation from 1964 results. Totals may change to a minor extent when annual summaries are completed.

Through December (nearest 500)	1965	1964
Rockfish	1,328,500	952,000
Kelp, sand bass	1,218,500	1,089,000
Bonito	790,500	1,262,500
Barracuda	438,000	298,500
California halibut	116,500	138,500
Salmon	51,500	92,000
Striped bass	16,500	34,000
Yellowtail	12,500	39,000

San Francisco and San Pablo Bay salmon and striped bass fisheries suffered a serious decline. There was little difference in striped bass catch localities, although a slightly higher percentage (11% compared to 7% in 1964) were taken outside the Golden Gate. Rockfish assumed greater importance in 1965, probably because of a decline in bonito and yellowtail catches. More emphasis was placed on barracuda fishing, fortunately there were more of these fish around. Kelp and sand bass were available at near-record levels for the third consecutive year.

B. Environmental and Behavioral Studies of Coastal Sportfishes (DJ F22R-2)

Considerable effort was expended on the project's manuscript "Artificial Reef Ecology."

On January 4, we collected a sample of spiny lobsters. Most of the females had maturing ovaries. Another scheduled trip to San Clemente Island postponed due to inclement weather, was being made at month's end.

Turner met with Mr. H. P. Vind (U.S. Navy Civil Engineering Lab. - Port Hueneme) to discuss algae as natural breakwaters along our coast.

Turner and Strachan met with John Zasadzinski, Santa Ana River Basin Regional Water Quality Control Board to discuss a proposed ecological investigation off the mouth of the San Gabriel River.

The project remains behind schedule.

C. Northern California Marine Sport Fish Survey (DJ F12R8)

The project was activated 1 January 1966 with routine censusing of the pier, skindiving, shore, skiff and partyboat fisheries. The study includes all fishing facilities and access areas from the Golden Gate to Pt. Lobos, Monterey County.

Aerial censuses were made on January 16 and 17. All fishermen and Pismo clammers were tallied from the Russian River to Pt. Lobos. Observations on gray whales and sea otters were also made.

The final copy of the blue rockfish manuscript is being prepared and will soon be submitted for publication. We are now behind schedule on this paper.

The ozalid copy of the revised Field Guide to Some Common Ocean Sport Fish was received from the printer. This revised guide will be available in about a month.

Miller presented a talk on the findings of the blue rockfish study to the Santa Cruz Skin Diving Club on January 26, 1966.

D. Southern California Marine Sport Fish Survey (DJ F20R-4)

Routine sampling of shoreline sportfishing activities continued throughout the month. One sample was lost when an emergency beaching of a private craft required the services of our field man. The vessel and all hands came ashore safely.

Two aerial flights to measure sportfishing pressure along the shoreline were successfully completed. These flights, one during a week day and one on a weekend, provided additional quantitative evidence that fishing pressure on weekends is significantly higher than on week days.

A skindiving meet scheduled for January 30 was called off due to adverse weather.

A program to compile and compute the data gathered by our shoreline sportfishing survey was completed at month's end. Next we will edit data sheets, convert to IBM cards, and be off to the computer for production runs.

Project is on schedule.

6. SPECIAL PROJECTS

A. Southern California

Report writing took up most of the month. Data on Pismo clam censuses for the 5-years, 1961-1965, were put together for a California Fish and Game article. Progress was made on the Santa Monica Trawl Study manuscript.

Routine duties occupied the rest of the month.

Project is on schedule.

B. Northern California

All stations of the San Francisco Bay Study were sampled from the "Nautilus." Repairs to the Newark fish trap were completed. Damage resulted from the trap catching a 3,000-pound yacht. The yacht was released the following day.

Assistance was given the Shellfish Project in the clam census at Sunset Beach, Monterey Bay.

7. BIOSTATISTICS

A. Data Processing

Regular Reports

The October and November, 1965 statistical reports of landings and shipments were completed.

December cannery and processor reports were completed and the monthly and annual tuna letters summarizing these data were mailed.

The Pacific Mackerel III reports for August and September were completed.

The December marine partyboat catch was compiled and the letter reporting the catch was mailed.

Special Reports

The California Marine Fish Catch for 1964, Fish Bulletin 132, was received from the state printer and mailed.

A series of reports summarizing the 1964-1965 shrimp log data were prepared for Walt Dahlstrom.

The tons of kelp harvested from 1961 through 1965 were tabulated for Wheeler North.

The number of rockfish caught in the Farallon Island area by partyboats from 1960 to 1964 were summarized for Dan Gotshall.

Key punching and listing of the creel census data of the Coldwater Reservoir Project was completed. The cards and reports were transmitted to Dave Borgeson of Inland Fisheries.

The 1964 albacore log data were summarized using the UNIVAC 1107. Estimates of catch and catch-per-unit-of-effort for each 1^{o} square were computed.

Work in Progress

Work has started on balancing annual processor reports in preparation for publishing the 1965 Circular.

Market and cannery receipts for January are being edited.

Plans to present a short course in data processing to staff biologists are being formulated. A procedure manual is being written to document the albacore log book editing and analysis programs. This section together with the procedure being written by the Tuna Investigation will form a comprehensive guide to the albacore log book system.

Field

Fish dealers and processors from Morro Bay to San Diego were contacted. Problems concerning fish receipts and processor reports were resolved.

An article describing the 1963-1964 inshore bait fishery was completed.

B. Technical Assistance and Biometrical Analysis

Statistical and Mathematical Analysis

Work continued on a paper describing the shrimp sampling plan.

Discussions on population dynamics and computer programming problems were held with several staff members.

Computers

The fishing power program is completely de-bugged except for a few format changes. The production run will be completed by February 15.

Random tow locations and random sub-sampling numbers were obtained from runs of these programs. The output will be used on the spring cruise.

Spaulding attended a meeting of the Statistical Program Evaluation Committee (SPEC) at Douglas Aircraft, Santa Monica. Over a hundred computer programs are available to us through this group.

8. EDITORIAL NOTES

Fish Bulletins

At the beginning of 1966, nine manuscripts were on hand that had been submitted for publication as Fish Bulletins, but no funds were available for publishing any of these. Two manuscripts were in press (as Fish Bulletins) on January 1, and one of these (No. 132, Marine Fish Catch) had been received from the printer at the end of the month. The only other Bulletin likely to be printed during this fiscal year concerns the Delta Study; it should be off the press during late February or early March.

Species Identification Booklets

Offshore Fishes of California (3rd revision) was as far along as ozalid proof at the beginning of the year, and by the end of the month, a corrected copy of Inshore Fishes of California (3rd revision) had been sent to the Conservation-Education Section for submission to the printer. Ozalid proof for a combined edition of A Field Guide to Common Marine Fishes of California (Miller, Gotshall, and Nitsos) was received by the authors during January, and if all goes well at the printing plant it too should be off the press by the time another month has rolled around.

California Fish and Game

Numerous articles on marine subjects were on hand for the July issue of the quarterly (The April issue was in the printer's hands), but by cutting most of these to the bone during the editorial process, we were able to stay within the page limitations imposed upon this journal. The printer has continued to procrastinate in getting the quarterly out during the allotted period and the January issue was no exception. We hope to receive it in February.

9. BIOLOGICAL NOTES

During last summer and fall, bonito were plentiful in Monterey Bay. Fishermen report that occasional bonito are still being caught with hook and line. Also, a few pompano have appeared in hauls for anchovy. Inshore surface seawater temperatures in Monterey Bay have been only a little warmer than usual for January - 53° to 54F° for the month.

10. MISCELLANEOUS

A. Meetings, Talks and Visitors

Jan. 4 - An assembly interim committee consisting of Pauline Davis, C. Biddell, George Milias and Frank Billotti visited the Eureka laboratory.

Jan. 4 - Aplin met with Don Lollock and other Region III personnel to discuss plans for Bolinas Bay development.

Jan 4. - Carlisle met with Max Ernest and Bob Zieve of Pan Petroleum Oil Co. from Denver to solve seismic problem, Terminal Island.

Jan. 5 - Smith lectured on sole age, growth and mortality to the Commercial Fisheries class at Humboldt State College.

Jan. 5 - Bill Craig spoke to 50 members of the Los Angeles Rod and Reel Club. He discussed the 1965 albacore season and answered numerous questions concerning anchovy legislation.

Jan. 5, 9, 27 - Baxter attended CalCOFI committee meetings at La Jolla.

Jan. 6 - Young attended the annual installation of officers of the Newport Sea Horse Spinfishing Club.

Jan. 6 - Aplin spoke to the California Water Pollution Control Association, San Francisco Bay Section, on the San Francisco Bay Study and showed the Department motion picture on pollution. Sixty people were present.

Jan. 6 - Harold Clemens attended a luncheon at the southern California Tuna Club.

Jan. 11 - Gotshall discussed crab sport fishing on an Eureka outdoor television show.

Jan. 12 - Gotshall spoke to the Commercial Fisheries class at Humboldt State College.

Jan. 12 - Serge V. Spiridonoff, Department of PublicHealth, Santa Rosa and Jim Adams, Pacific Gas and Electric Co., visited the Eureka laboratory.

Jan. 13 - Roedel and Don Johnson, BCF, conferred at length with W. M. Chapman regarding MRC matters.

Jan. 13 - David Marty and Glenn Twitchell Engineers from the Water Resources Project of Sacramento took a tour of the waterfront with Wood to look at fish pumps.

Jan. 13 - Leo Pinkas spoke to 26 Redondo Union High School students on Fishing and Fisheries Biology as a vocation.

Jan. 14 - Carlisle attended Fish and Game Commission meeting where agenda items included seismic work and harbor seals, Los Angeles.

Jan. 14 - Messersmith attended State Fish and Game Commission Meeting at Los Angeles.

Jan. 14 - MRO Staff Meeting was held at the Terminal Island Laboratory.

Jan. 17 - Roedel and Don Johnson, BCF, discussed MRC problems with Julian Burnette in Los Altos.

Jan. 17 - Carlisle, Fitch and Young, participated in meeting on marine fish hatcheries with Dr. Carl Hubbs, John Prescott, J. Charles Davis, and Don Davis, Marineland.

Jan. 18 - Roedel, Orcutt, Poole and Gates, met with BCF representatives Loosanoff, Norris, and Starlund to tour potential shellfish laboratory sites in connection with Bartlett Bill monies.

Jan. 19 - Messersmith met with the Placement Bureau Officer at University of California, Irvine campus.

Jan. 21 - Roedel and Don Johnson, BCF, conferred with the new director of Scripps Institution of Oceanography, Dr. Nierenberg regarding MRC-CalCOFI relationships. They later talked to Dr. M.B. Schaefer on the same general subject.

Jan. 22 - Someone visited the Biostatistics section and flooded the machine room.

Jan. 25-25 - Roedel attended Assemblywoman Davis' interim committee hearings on the Fish and Wildlife Plan in Sacramento.

Jan. 24-25 - Orcutt attended Shellfish Mortality meetings in Newark, Delaware.

Jan. 26 - Roedel participated in the first meeting of the Departmental Classification Committee, Sacramento.

Jan. 26 - R. Poole and Gotshall met with Dr. Loosanoff to discuss aspects of laboratory shellfish culture.

Jan. 26 - Dahlstrom spoke on oysters to 20 members of the Sunnyvale Exchange Club.

Jan. 26 - Young presented a talk on the organization and duties of Marine Resources Operations to an adult class of 15.

Jan. 27 - Leo Pinkas spoke to 65 members and guests of the San Pedro Izaak Walton League about our shoreline creel census work.

Jan. 28-29 - Aplin attended the California-Nevada section of the Wildlife Society in Reno.

Jan. 29 - Aplin gave a talk entitled "Hazards to the Biology of San Francisco Bay" to the California-Nevada section of the Wildlife Society.

B. Personnel

Jan. 1 - James E. Phelan, promoted to Marine Biologist II.

Jan. 1 - John M. Deinstadt, Aquatic Biologist I, transferred to Region 4, Fresno.

Jan. 14 - John Modin took over Pesticide Monitoring position which will be established retroactively as an AB I effective this date.

Jan. 16 - Harold Hyatt, Marine Biologist II, left to accept a position as Assistant Social Research Analyst with the Department of Mental Hygiene.

Jan. 17 - Robert R. Bell returned from a one year leave of absence (FAO, Kenya) to his former position as Marine Biologist III in the Tuna Program.

Jan. 17 - James D. Messersmith, Marine Biologist III, transferred to the new Pelagic Fish Anchovy Program.

Jan. 18 - Sally A. Gogin, appointed Librarian II.

Jan. 31 - Gary C. Varney, AB I, Crescent City, separated.

Phil M. Roedel
Manager

MRO/TI
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